

Application Note

DPA-5, FPA-4, P-500, VISC-4

The Use of BARTEC's Process Analytical Technology in Bio-based Feedstock and Final Product Blending



APPLICATION NOTE

Energy is essential to drive our global economy. Due to the increasing demand for energy, the limited availability of fossil resources and the growing negative impact on our environment, alternative CO₂-neutral energies are becoming increasingly important. Biofuels such as Bioethanol, Biodiesel and Renewable Natural Gas (RNG) are now the alternatives to fossil fuels in one of the most pollutant human activities: transportation. In order to remain competitive, today's refineries must be able to integrate this new bio-based feedstock into their processes as efficiently and economically as possible as well as setting themselves in the position to react quickly to changing feedstock, recipe demands and requirements.

Leveraging BARTEC's decades of experience in physical property analysis and an installed base of well above 2000 units, the PAT product portfolio was developed to target the growing demands of 21st-century refineries. BARTEC's process analyzers are designed to provide

industry-leading performance, reliability and longevity. This is achieved by using only the highest quality components combined with high quality manufacturing under strict quality control.

Bio-based Feedstock in Refineries

The selection of bio-based feedstock to blend throughout the refinery is as diverse as available crude types and can be animal-based (e.g. lard waste) or plant-based (e.g. soybean oil). Most important here is that it should have the least impact on traditional crude-based processing. For biodiesel as feedstock for middle distillates the ASTM standard D6751 establishes specifications that defines

biodiesel as mono-alkyl esters of long chain fatty acids derived from animal fats and plant-based oils. The type of alcohol used is not further specified. Thus mono-alkyl esters could be produced with any monohydroxy alcohol (methanol, ethanol, etc.) so long as it meets the detailed requirements outlined in the fuel specification.

Table 1: List of some Biodiesel specifications according to the ASTM D6751 standard

Property	Limit	Test Method	ASTM Compliant Process Analyzer	Correlating Fast Process Analyzer
Flash Point	93°C min	ASTM D93	P-500	FPA-4
Distillation Temperature	T90: 360°C max	ASTM D1160	DPA-4 LowP	rapiDist-4
Kinematic Viscosity	1.9 to 6.0 cSt	ASTM D445	VISC-4	-

Biodiesel in Final Product Blending

Final product blending plays an important role in preparing the refinery products within the stipulated product specifications and environmental regulations. Almost all refinery marketable products are blended for the optimal use of the intermediate product streams. Gasoline and diesel blending is therefore one of the important processes to optimize profitability and increase profit by reducing give-away of intermediates with higher economic value.

The advantage of biodiesel here is its compatibility with existing diesel engines and

distribution infrastructure. Biodiesel, as a drop-in biofuel, can be blended with conventional petroleum diesel in any proportions. For diesel the set of product quality parameter contains e.g. Flash Point, Viscosity, Cold Flow (Cloud, Pour and Cold Filter Plugging Points) and Distillation Parameters (T10, T50, T90)

To optimize the blending process most accurate measurement of the major product quality parameter using high performance online process analyzers are of utmost importance.